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विलीन एसीटलीन गैस सिलिंडरों का निरीक्षण और रख-रखाव — रीति संहिता

(दूसरा पुनरीक्षण)

Periodic Inspection and Maintenance of Dissolved Acetylene Gas Cylinders — Code of Practice

(Second Revision)

ICS 23.20.30

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Gas Cylinders Sectional Committee, MED 16

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Gas Cylinders Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1977 and subsequently revised in 1984. In this revision following major changes have been made:

a) Scope has been modified;

b) Terminology has been included;

c) Preparation of gas cylinder clause modified; and

d) New clauses like internal for periodic inputs clause, identification of contents, marking, records, rejection and rendering cylinders unserviceable and disposal of unserviceable cylinder have been added.

Acetylene cylinders differ from all other cylinders transporting compressed or liquefied gases in that they contain a porous mass and normally a solvent in which the acetylene stored is dissolved. For the periodic inspection cycle, due regard is to be given to the different types of porous masses. The remainder of this code should be read considering these differences. The primary objective of the presence of the porous mass is to limit an acetylene decomposition, should it be initiated, and thus prevent a cylinder incident.

The requirements dealt with in this code are mainly those that are specific for acetylene cylinders; for more general requirements related to the periodic inspection of gas cylinders, reference is made to the relevant Indian Standards.

In the preparation of this Code considerable assistance has been taken from ISO 10462 : 2013 'Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance'.

Due to the presence of a porous mass in the cylinder, neither a hydraulic or pneumatic pressure test, nor a visual inspection of the internal surface of the shell can be carried out.

While implementing this Code compliance with statutory regulations shall be ensured.

The composition of the Committee responsible for the formulation of this Code is given in Annex F.

For the purpose of deciding whether a particular requirement of this Code is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this Code.

Indian Standard

CODE OF PRACTICE FOR PERIODIC INSPECTION AND MAINTENANCE OF DISSOLVED ACETYLENE GAS CYLINDERS

(Second Revision)

1 SCOPE

This code specifies the requirements for periodic inspection of acetylene cylinders.

2 REFERENCES

The standards listed below contain provisions which, through reference in this text, constitute provisions of this code. At the time of publication, editions indicated were valid. All standards are subject to revision and parties to agreements based on this code are encouraged to investigate possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
170 : 2004	Acetone — Specification (*fourth revision*)
3224 : 2002	Valve fittings for compressed gas cylinders excluding liquefied petroleum gas (LPG) cylinders — Specification
7241 : 1981	Glossary terms used in gas cylinder technology
7312 : 1993	Welded and seamless steel dissolved acetylene gas cylinders — Specification (*second revision*)
9200 : 1988	Methods of disposal of unserviceable compressed gas cylinder (*first revision*)
IS/ISO 11114-2 : 2013	Transportable gas cylinders — Compatibility of cylinder and valve materials with gas contents: Part 2 Non — metallic materials
15975 : 2013	Gas cylinder — Condition for filling gas cylinder

3 TERMINOLOGY

For the purpose of this code, the following definitions in addition to given in IS 7241 shall apply:

3.1 Acetylene Bundle — Transportable unit consisting of two or more acetylene cylinders manifolded together within a rigid frame, equipped with all necessary equipment for filling and emptying in the assembled state.

3.2 Dissolved Acetylene Cylinder — A portable vessel (*see* IS 7312) having a valve and with or without safety devices, filled with monolithic or non-monolithic porous mass, a solvent for the storage of dissolved acetylene and at least sufficient quantity of sufficient acetylene to saturate the **solvent (acetone as per IS 170)** at atmospheric pressure and at a temperature of 15°C.

NOTE — Acetone or any other solvent used shall not be capable of chemical reaction with the acetylene gas or with the porous mass or with the metal of the cylinder or valve.

3.3 Acetylene/Solvent Ratio — Ratio of the maximum acetylene content to the specified solvent content.

3.4 Statutory Authority — Petroleum and Explosives Safety Organization, Ministry of Commerce, Government of India.

3.5 Competent Person — Person who by a combination of training, experience and supervision is able to make objective judgments on the subject.

3.6 Complete Cylinder — Cylinder shell ready to be charged with acetylene gas that is complete with porous mass, solvent with or without safety device.

3.7 Cylinder Shell — Pressure vessel manufactured and tested and suitable for receiving porous mass, solvent and to be filled as an acetylene cylinder. Saturated gas-acetylene that remains dissolved in the solvent in the cylinder at the atmospheric pressure.

3.8 Manufacturer — Company responsible for filling the cylinder shell with porous mass and which generally prepares it for the first charge of acetylene.

3.9 Maximum Acetylene Content — Specified maximum mass of acetylene the cylinder is designed to contain.

NOTES

1 Maximum acetylene content is expressed in kilograms.

2 When a solvent is used, it includes the saturation gas.

3.10 Maximum Permissible Settled Pressure — Maximum permissible gauge pressure in bar when converted to a temperature of 15 °C, in a cylinder containing the maximum acetylene content and the specified solvent content.

NOTE— Maximum permissible settled pressure is expressed in bar.

3.11 Porosity — Ratio of the total volume (water capacity) of the cylinder shell minus the volume of the solid material of the porous mass, to the water capacity of the cylinder shell.

NOTE— Porosity is expressed as a percentage.

3.12 Porous Mass Porous Substance — Single or multi-component material introduced or formed in the cylinder shell in order to fill it and that, due to its porosity, allows the absorption of the solvent and acetylene gas solution.

NOTE — The porous mass may be monolithic or non-monolithic. Monolithic porous mass consists of a solid product typically obtained by reacting materials or by bonding materials together with a binder. Non-monolithic porous mass consists typically of granular, fibrous or similar materials without addition of a binder.

3.13 Solvent — Liquid that is compatible to the porous mass and cylinder shell.

3.14 Tare Weight — Acetylene cylinder means the weight of the cylinder together with any permanent with attachments, cylinder valve, solvent and saturation gas.

NOTE — Total weight is expressed in kilograms.

3.15 Water Capacity (Cylinder Shell Volume) — Actual water capacity of the empty cylinder shall measured in litres before being filled with porous mass.

NOTES

1 Water capacity is expressed in litres.

2 The cylinder shell is defined as being empty of any porous mass (*see* **3.7**).

4 INTERVALS BETWEEN PERIODIC INSPECTIONS

A cylinder shall be due for periodic inspection on its first receipt by a filler after the expiry of the interval in accordance with the requirements of the Gas Cylinder Rules, 2004.

Provided the cylinder has been subjected to normal conditions of use and has not been subjected to abusive and abnormal conditions rendering the cylinder unsafe, there is no general requirement for the user to return a gas cylinder before the contents have been used even though the inspection interval may have lapsed.

It is the responsibility of the owner or user to submit the cylinder for a periodic inspection and test within the interval specified in the Gas Cylinder Rules, 2004 and IS 15975.

5 PREPARATION OF GAS CYLINDER

5.1 Removal of Gas

Before proceeding with the inspection, cylinders shall be depressurized of gas. Cylinders shall be checked for pressure both before and after depressurization. Depressurization shall be carried out in a safe manner having due regard to the characteristics of acetylene. Depressurization shall be carried out over a period long enough to ensure removal of all acetylene, except saturation gas. Precautions shall be taken because variations in temperature influence the quantity of acetylene in the form of saturation gas.

The absence of a positive pressure reading does not clearly indicate the absence of excess gas due to the possibility of a blocked valve (*see* Annex A).

In case of any doubts regarding the efficiency of the depressurization cycle, the cylinder should be weighed.

A cylinder weighing more than the tare weight (*see* **3.14**) stamped on the cylinder is not always a clear indication of the presence of excess gas. Some relevant factors that have to be considered include a possible excess of solvent or contamination with water, etc.

A cylinder weighing less than or equal to the stamped tare weight is not always a clear indication of the absence of gas under pressure. Some relevant factors that have to be considered include a possible solvent shortage and external corrosion causing a loss of shell weight.

5.2 Preparation for External Visual Inspection

When necessary, the cylinder shall be cleaned and have all loose coatings, corrosion products, tar, oil or other foreign matter removed from its external surface by a suitable method, for example by brushing (under closely controlled conditions to ensure that there is no leakage of acetylene into the brushing). The method used to clean the cylinder shall be a validated, controlled process. Care shall be taken at all times to avoid damaging the cylinder and pressure relief devices where fitted or removing excess amounts of cylinder wall (*see* Annex B).

The external visual inspection in accordance with **6.1** can be carried out at this stage using non-sparking tools recommended for acetylene gas.

5.3 Valve Removal

Before removing the valve from an acetylene cylinder, it shall be determined that the cylinder has been completely depressurized as described in **5.1**. If there is any reason to believe that a valve is blocked, for example the lack of an audible release of gas when opening the valve, and that the cylinder may still contain residual gas under pressure, checks shall be made, for example by introducing an inert gas at a pressure lower than 5 bar and observing its discharge.

If it is found that the valve is obstructed, then a suitable method shall be employed to remove the gas or the valve, taking into consideration the design of the valve and taking all necessary precautions having due regard to the hazards that can result from an uncontrolled operation (*see* Annex A). De-valving shall take place in the open or in a ventilated area. The temperature of the cylinder when removing the valve should be close to the ambient temperature to avoid either excess venting of residual gas from the cylinder or ingress of air into the cylinder.

NOTE — The cylinders should not be left open or without valves longer than necessary for the inspection.

5.4 Removal of Neck/Core Hole Filters

Acetylene cylinders usually contain neck filters/core hole packing consisting of filter/gauze and felts. Neck filters and packing materials placed between the top of the porous mass and the base of the valve stem shall be removed to ensure no damage to porous mass in accordance with the inspection requirements of the porous mass manufacturer. All neck filters and felts shall be rejected. When the inspection requirements cannot be established, a competent person shall define such inspection requirements. For various types of neck/core hole filters (*see* Annex C).

Special care shall always be taken when removing filters or packing material in view of the possibility of some restrictions at the neck with residual pressure underneath, which, if suddenly released, might blow the filter out with some of the porous substance and may cause injury. The presence of fine carbon powder on the filters or packing material could indicate that flashback has occurred, all such cylinders shall be rejected.

6 INSPECTION AND MAINTENANCE

6.1 External Visual Inspection

The external surface of each cylinder shall be inspected for:

a) Dents, cuts, gouges, bulges, cracks, laminations (*see* Table 1 of Annex B) and excessive removal of material from the cylinder base;

b) Heat damage, torch or electric-arc burns (*see* Table 1 of Annex B);

c) Corrosion (*see* Table 2 of Annex B); Special attention shall be given to areas where water can be trapped. These include the entire base area, the junction between the cylinder shell and the foot ring and the junction between the cylinder shell and the valve and the neck ring (if applicable).

d) Other defects such as illegible, incorrect or unauthorized stamp markings, or unauthorized additions or modifications (*see* Table1 of Annex B); and

e) Integrity of all permanent attachments (*see* Table 2 of Annex B).

Damaged valve guards, threaded neck rings and foot rings can be repaired or replaced as appropriate. No welding or any heat shall be directly applied to the pressure containing part of the cylinder.

For rejection criteria, *see* Annex B. Cylinders no longer suitable for future service shall be rendered unserviceable (*see* **10**).

SAFETY PRECAUTIONS — Acetylene cylinders cannot be completely emptied. They will always contain some residual gas and solvent (except for solvent-free acetylene cylinders). Therefore, special care should be taken when repairing acetylene cylinders using methods that can be a source of ignition (for example through heat or sparks).

6.2 Examination of the Porous Mass

After the removal of neck/core hole filters in accordance with **5.4**, the porous material shall be inspected for the presence of visible contamination or other defects that could affect the ability to suppress an acetylene decomposition. The inspection shall be performed by the appropriate use of special non-sparking tools such as metal wire probes, rods, feeler or clearance gauges to check the firmness and the presence of voids or other defects in the porous material. Rejection criteria are given in **6.2.1** to **6.2.3**. Care shall be taken to ensure that the porous material is not damaged by the inspection tools (*see* Table 1 of Annex B, flash back.)

6.2.1 *Contamination*

The porous mass shall be checked visually for contamination such as the presence of significant fine carbon powder (*see* **5.4**), water, or oil deposits or whether there has been a discoloration of the porous mass. The following guidelines shall apply:

a) Cylinders in which any soot is visible shall be rejected; and

b) Cylinders in which water or oil deposits are visible shall be rejected depending on the level of such contamination. For monolithic porous materials, this is often visible through greying of the porous material

6.2.2 *Monolithic Masses — Cracking or Crumbling*

The visual inspection shall verify that the porous mass shows no excessive top clearance (gap between the top of the cylinder shell and the monolithic porous mass), and no excessive cracking or crumbling.

Cylinders with masses that show cracking or crumbling less than 1 mm width when they do not incorporate break outs or dislodging of the mass are acceptable. Small break outs in the top of the cylinder neck/ shoulder area are acceptable as long as the maximum gap is not exceeded at any point (*see* Annex D).

6.2.3 *Cavitation or Compaction*

The maximum gap between the top of the cylinder and the monolithic porous mass shall not exceed that specified in the type approval for that cylinder. For the cylinders made to IS 7312, the total clearance between the cylinder shell and filling material, does not exceed 0.5 percent of the respective diameter or length but in no case of exceed 3.2 mm measured diametrically and longitudinally. Only those gaps up to the maximum used in the type approval tests shall apply. If such data is unavailable for cylinders manufactured with monolithic asbestos-containing mass, the gap shall not exceed 3.2 mm and for cylinders with monolithic asbestos-free porous mass, the gap shall not exceed 2 mm. If at a later stage, cylinders with other gap sizes pass the requirements of the flash back test and are approved, then these gap sizes may also apply.

Additionally, the porous mass shall be checked to ensure that there is no significant lateral movement. Cylinders showing cavitation or significant lateral movement shall be rejected.

Non-monolithic porous masses that show cavitation or compaction, or a loss of compaction shall be rejected or repaired in accordance with **6.3**.

6.3 Repair of Non-monolithic Porous Mass

A non-monolithic mass that has been rejected due to cavitation shall only be repaired if the repair does not impair the safety of the cylinder.

The repair of a non-monolithic mass shall be performed according to the instructions of the porous mass manufacturer. The quantity of porous material that may be added at each periodic inspection shall not exceed 50 g. The cumulative total quantity of porous material added to the acetylene cylinder shall be limited so that the resulting porosity of the porous material is not decreased to an extent that it falls below the lower of the permissible limits. The minimum porosity of the porous material is either obtained from the type approval or is 1.5 percent below the nominal porosity (if no lower limit for the porosity is indicated in the type approval).

The quantity of material added shall be recorded, the tare weight of the cylinder adjusted as appropriate and the stamp marking adjusted accordingly.

A cylinder that contains a rejected porous mass that is not suitable for repair in accordance with this clause shall be rendered unserviceable or its porous mass shall be replaced according to **6.4**.

6.4 Replacement of Porous Mass

If the porous mass is no longer acceptable, the complete cylinder shall be made unserviceable.

6.5 Inspection of Pressure Relief Devices Including Fusible Plugs

Where fusible plugs or other pressure relief devices are used, they shall be examined for damage. Where damage is found, the device shall be replaced and checked for gas tightness.

6.6 Inspection of Valves and other Accessories

If a valve or any other accessory is to be reintroduced into service, it shall be inspected and maintained to ensure that it will perform satisfactorily in service and meet the requirements of gas tightness from the valve manufacturing standards. An example of a suitable method is given in Annex E.

6.7 Inspection of Cylinder Neck

6.7.1 *Cylinder to Valve Threads*

When the valve is removed, the cylinder to valve threads shall be examined to identify the type of thread and to ensure that they are clean and of full form, free of damage, free of burrs, free of cracks, and free of other imperfections.

Cracks manifest themselves as lines that run vertically down the thread and across the thread faces. There should not be confused with tap marks (thread machining stop marks). Special attention should be paid to the area at the bottom of the threads.

6.7.2 *Other Neck Surfaces*

Other surfaces of the neck shall also be examined to ensure they are free of cracks or other defects.

6.7.3 *Neck Ring and Collar*

When a neck ring/collar is attached, a visual inspection shall be carried out to ensure that it is secure and that there is no thread damage. A neck ring shall be changed only using an approved procedure. If it is found that any significant damage to the cylinder has occurred by replacement of the neck ring/collar, the cylinder shall be rendered unserviceable.

6.8 Reassembly

Cylinders meeting the requirements of this code shall be reassembled by replacing, as specified by the porous mass manufacturer, any packing materials in the neck end and fitting new filters in such a way as to ensure that when the valve is fitted contact is made between the base of the valve stem and the filters/packings in accordance with IS 3224.

Where relevant regulations require, a ring shall be fitted over the stem of the valve prior to the valve being fitted to indicate the date (year) of the next periodic inspection.

7 IDENTIFICATION OF CONTENTS

Before the cylinder is reintroduced into service, the contents shall be identified/labelled as per the Gas Cylinder Rules, 2004.

8 MARKINGS

Each cylinder that passes the shell and porous mass inspection shall be marked with the date of the inspection and the symbol of the inspection body or test station in accordance with the Gas Cylinder Rules, 2004. The next inspection date shall be shown by an appropriate method such as a ring fitted between the valve and the cylinder indicating the date (year) of the next periodic inspection.

For monolithic masses, stamping on the shoulder of welded cylinders is not permitted unless a data plate is provided for that purpose or unless it is provided for by the specification to which the cylinder is manufactured. In such cases, the stamping may be on a ring under the valve.

9 RECORDS

A cylinder inspection record shall be retained for 15 years. It shall record sufficient information to positively identify the cylinder and the results of the inspection. The following information shall be available for inspection:

a) Owner's name;
b) Manufacturer's or owner's serial number;
c) Type and weight of porous mass added, if any;
d) Attachment replacement, if any;
e) Cylinder tare change, if appropriate;
f) Result of inspection and test (pass or fail — in case of failure, the reasons should be recorded);
g) Present retest date — year/month/day;
h) Identification symbol of retest body or test station;
j) Identification of retester; and
k) Details of any cylinder repairs made to defects as described in Annex B.

10 REJECTION AND RENDERING CYLINDRS UNSERVICEABLE

The decision to reject a cylinder may be taken at any stage during the periodic inspection and test procedure. If it is impossible to recover a rejected cylinder, after notifying the owner, the testing station shall make the cylinder unserviceable for holding gas under pressure so it is impossible for any part of the cylinder, especially the shoulder, to be re-issued into service as per the Gas Cylinder Rules, 2004 and IS 9200. In case of any disagreement, it shall be ensured that the legal implication of the contemplated action is fully understood.

Prior to taking any of the following actions, ensure that the cylinder is empty (*see* **5**).

The following methods may be employed for rendering cylinders unserviceable:

a) Crushing the cylinder using mechanical means; and
b) Irregular cutting of the cylinder in three or more pieces including the shoulder;

11 DISPOSAL OF UNSERVICEABLE CYLINDERS

Methods used for disposing of non-acetylene cylinders are inappropriate for acetylene cylinders because of the nature of the contents of an acetylene cylinder.

When disposing of acetylene cylinders, very careful consideration shall be given to the fact that the cylinders could contain residual acetylene, solvent and porous mass, which could contain asbestos. Disposal shall be in accordance with statutory requirements.

ANNEX A

(*Clauses* 5.1 *and* 5.3)

PROCEDURE TO BE ADOPTED WHEN DE-VALVING AND WHEN IT IS SUSPECTED THAT A CYLINDER VALVE IS OBSTRUCTED

A-1 CHECK FOR OBSTRUCTED VALVE

The following procedures shall be carried out only by trained personnel. In view of the potential hazards in acetylene cylinders, this operation can lead to injury from stored energy release and fire, hence personnel shall take such precautions as deemed necessary for the work to be performed. When the acetylene, if any, has been released and the pressure within the cylinder has been reduced to atmospheric pressure as described in **5.1**, the valve may be removed after an additional check is made to establish that there is free passage through the valve.

As indicated in **5.1** and **5.3**, a systematic check shall be made to establish that the passage through the valve is unobstructed. The method adopted shall be a recognized procedure such as by introducing inert gas at a pressure up to 5 bar and checking its discharge or a procedure that provides equivalent safeguards.

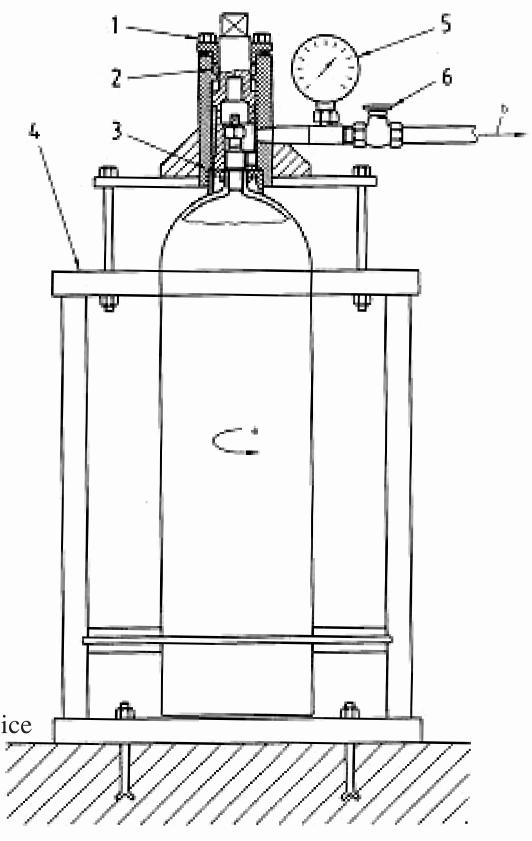
A-2 VALVE UNOBSTRUCTED

Only when it has been established that there is no obstruction to gas flow in the cylinder valve may the valve be removed.

A-3 VALVE OBSTRUCTED

When a cylinder is found to have an obstructed gas passage in the valve, the cylinder shall be set aside and handled only by specially trained personnel in this task. The preferred method to follow is to partially unscrew the valve within a glanded cap that is secured and joined to the cylinder and vented to a safe discharge.

The principles of a suitable device are illustrated in Fig. 1. This procedure shall be performed in a controlled manner in such a way as to avoid personal injury.



Key

1 = drive for de-valving machine
2 = gas tight gland
3 = gas tight seal
4 = cylinder frame and clamping device
5 = pressure gauge
6 = vent valve
a = direction of rotation
b = to gas disposal

FIG. 1 TYPICAL DEVICE FOR THE REMOVAL OF AN OBSTRUCTED GAS CYLINDER

ANNEX B

(*Clauses* 5.2, 6.1 *and* 9)

DESCRIPTION AND EVALUATION OF DEFECTS AND CONDITIONS FOR REJECTION OF ACETYLENE GAS CYLINDERS AT TIME OF VISUAL INSPECTION

B-1 GENERAL

Gas cylinder defects can be physical or material, or due to corrosion as a result of environmental or service conditions to which the cylinder has been subjected during its life.

B-2 PHYSICAL OR MATERIAL DEFECTS

Evaluation of physical or material defects in the cylinder shall be in accordance with Table 1.

Permanent attachments (*for example* footrings and shrouds) shall be inspected and shall be suitable for their intended purpose.

B-3 CORROSION

B-3.1 General

The cylinder could be subjected to environmental conditions that could cause external corrosion of the metal.

Extensive experience and judgment are required in evaluating whether cylinders that have corroded internally are safe and suitable for return to service. The surface of the metal shall be cleaned of corrosion products prior to the inspection of the cylinder.

Table 1 Rejection Limits Relating to Physical and Material Defects in the Cylinder Shell

(*Clauses* 6.1, 6.2 *and* B-2)

Type of Defect	Definition	Rejection Limits	
Bulge	Visible swelling of the cylinder	All cylinders with such a defect	
Dent	A depression in the cylinder that has neither penetrated nor removed metal and is greater in depth than 1 percent of the outside diameter	When the depth of the dent exceeds 3 percent of the external diameter of the cylinder or when the diameter of the dent is less than 15 times its depth	
Cut or gouge	A sharp impression where metal has been removed or redistributed and whose depth exceeds 5 percent of the cylinder wall thickness	For seamless-steel or seamless aluminium-alloy cylinder shells: when the depth of the cut or gouge exceeds 15 percent of the wall thickness or when the length of the cut or gouge exceeds 25 percent of the external diameter of the cylinder	For welded-steel cylinder shells: when the depth of the cut or gouge exceeds 10 percent of the wall thickness of the cylinder or when the length of the cut or gouge exceeds 25 percent of the external diameter of the cylinder
Crack	A split or rift in the metal	All cylinders with such defects	
Fire damage	Excessive general or localized heating of a cylinder usually indicated by: a) partial melting of cylinder; b) distortion of cylinder; c) charring or burning of paint; d) fire damage to valve, melting of plastic guard or date ring or fusible plug, if fitted.	All cylinders in categories (a) and (b) All cylinders in categories (c) and (d) may be acceptable after inspection and testing	
Flash back	Ignition of acetylene within the cylinder	All cylinders with such a defect	
Plug or neck inserts	Additional inserts fitted in the cylinder neck or base	All cylinders unless it can be clearly established that addition is part of approved design	
Stamping	Marking by means of a metal punch	All cylinders with illegible or incorrect markings (see **6.4**)	
Arc or torch burns	Partial melting of the cylinder, the addition of weld metal or the removal of metal by scarfing or cratering	All cylinders with such defects	
Suspicious marks	Marks introduced other than by the cylinder manufacturing process and approved repair	All cylinders with such defects	

B-3.2 Types of Corrosion

The types of corrosion shall in general be classified as in Table 2.

Table 2 Rejection Criteria for Corrosion of the Cylinder Wall

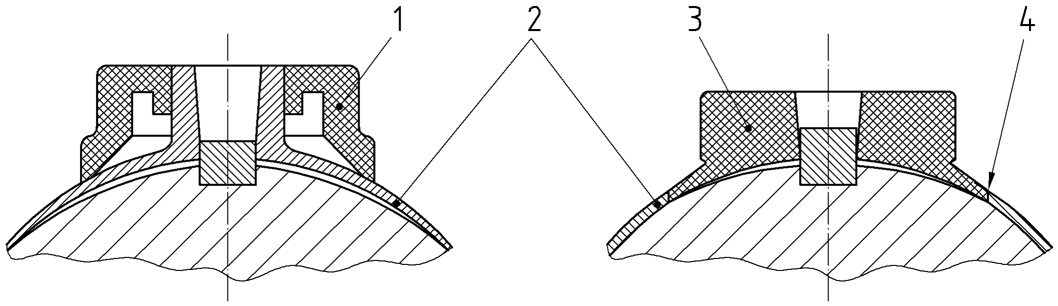
(*Clauses* 6.1 *and* B-3.2)

Types of Corrosion	Definition	Rejection Limits
General corrosion	Loss of wall thickness over an area of more than 20 percent exterior total surface area of the cylinder	If the original surface of the metal is no longer recognizable or If the depth of penetration exceeds 10 percent of the original thickness of wall or If the wall thickness is less than minimum guaranteed wall thickness
Local corrosion	Loss of wall thickness over an area of less than 20 percent of the total surface area of the cylinder, except for the other types of local corrosion described below	If the depth of penetration exceeds 20 percent of the original thickness of the cylinder wall or If the wall thickness is less than minimum guaranteed wall thickness
Chain, pitting or line corrosion	Corrosion forming a narrow longitudinal or circumferential line or strip, or isolated craters or pits that are almost connected	If the total length of corrosion in any direction exceeds the diameter of the cylinder and the possible depth exceeds 10 percent of the original wall thickness
Crevice corrosion	Corrosion associated with and taking place at or immediately around an aperture	If, after thorough cleaning, the depth of penetration exceeds 20 percent of the minimum guaranteed wall thickness

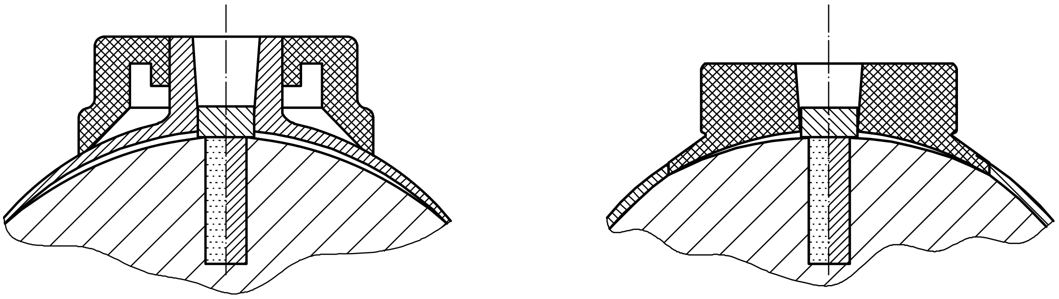
ANNEX C

(*Clause* 5.4)

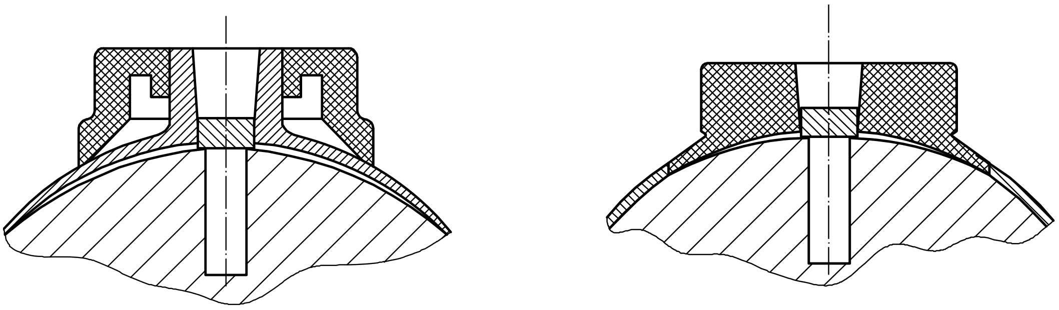
TOPS OF ACETYLENE CYLINDERS CONTAINING MONOLITHIC POROUS MASS



a) Monolithic porous mass without core hole, valve hole filled with felt, metal screen on top of felt filter



b) Core hole filled with felt, wood or fibrous padding material, metal screen on top of felt filter in valve hole



c) Core hole filled with granular material, metal screen on top of felt filter in valve hole

Key

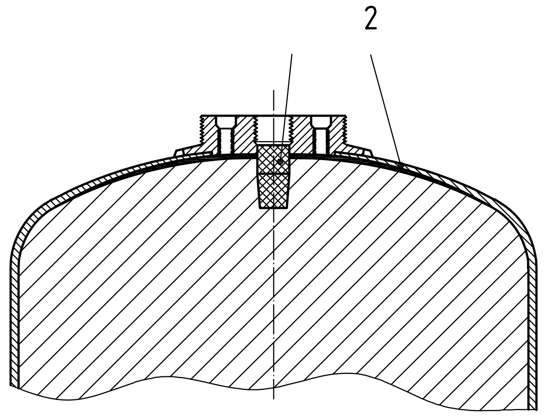
1 — neck ring

2 — top clearance

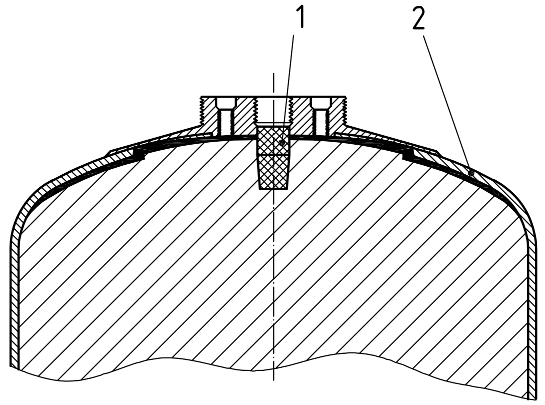
3 — head plate

4 — weld area

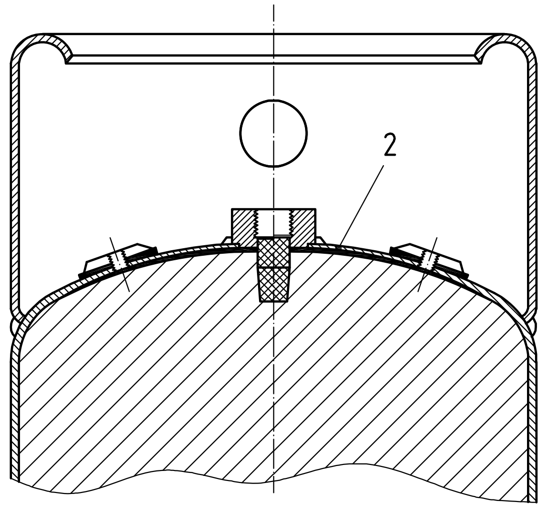
Fig. 2 Diagram of the Tops of Seamless (left) and Welded (right) Acetylene Cylinders Containing Monolithic Porous Mass: Types without Pressure Relief Devices



a) Ellipsoidal/toroidal head with marking on shoulder



b) Ellipsoidal/toroidal head with flange marking



c) Ellipsoidal/toroidal head with collar: marking on collar

Key

1 — fusible plug (location and quantity can vary).

2 — top clearance.

NOTE — Porous mass may exhibit no core hole or a core hole of varying depths. In all cases, the open space is filled with felt, fibrous padding material or a granular material. A metal screen is positioned between this material and the valve.

Fig. 3 Diagram of Acetylene Cylinders with Ellipsoidal Tops Containing Monolithic Porous Mass: Cylinders with Pressure Relief Devices

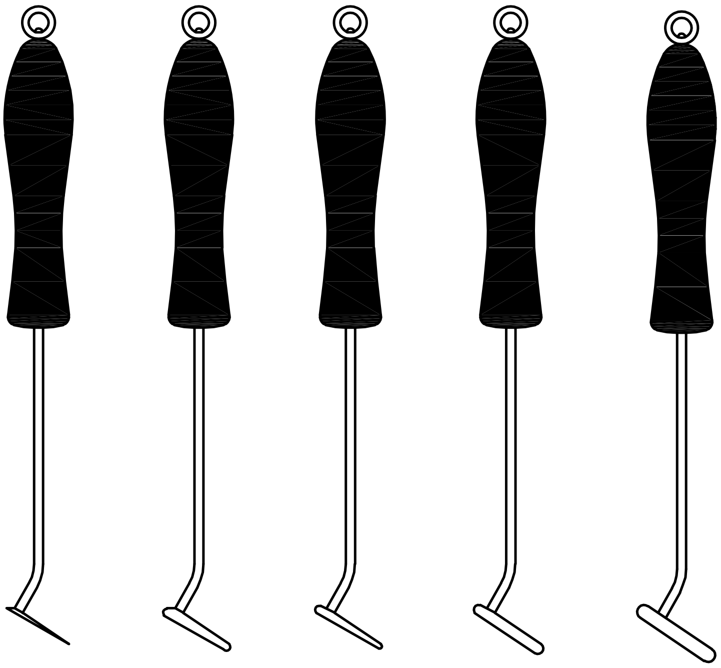


Fig. 4 Examples of Top Clearance Gauges for Measuring the Top Clearance Between the Cylinder Shell and the Monolithic Porous Material

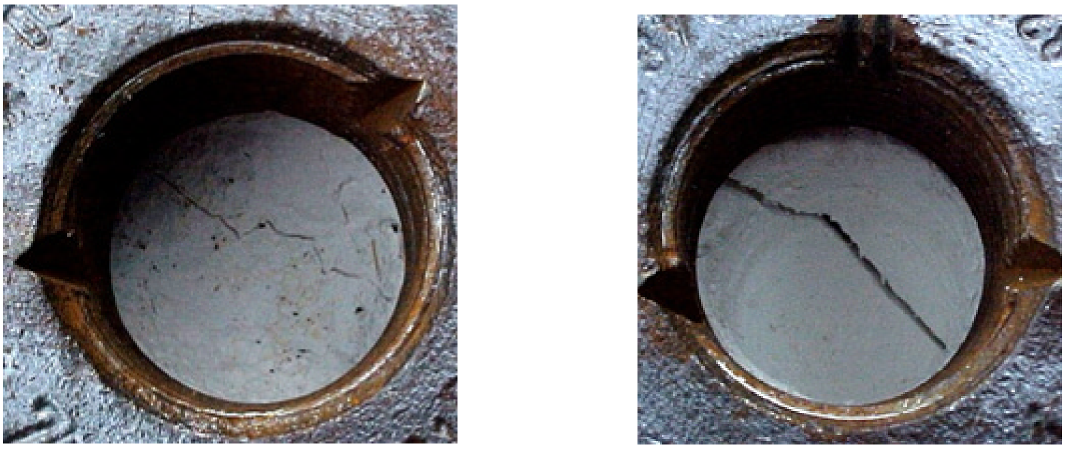
ANNEX D

(*Clause* 6.2.2)

ILLUSTRATION OF CRACKS IN THE POROUS MASS OF AN ACETYLENE CYLINDER, AND TOOLS AND CLEARANCE GAUGES

D-1 Figure 5A shows an acetylene cylinder with mass that shows cracking and crumbling but that could be acceptable for further service. The cylinder may be further used provided there are no break-outs and the porous mass cannot be dislodged.

D-2 Figure 5B shows an acetylene cylinder with a mass that shows cracking and crumbling and that shall be rejected.



5A HAIRLINE CRACK WITHOUT VISIBLE SIDEWALLS

5B CRACK WITH VISIBLE SIDEWALLS

Fig. 5 Cracks in the Monolithic Porous Mass of an Acetylene Cylinder

ANNEX E

(*Clause* 6.6)

INSPECTION AND MAINTENANCE OF VALVES AND THEIR JUNCTIONS: RECOMMENDED PROCEDURES

All threads shall be checked to ensure the thread diameters, form, length and taper are satisfactory.

If threads show signs of distortion, deformation or burring, these faults shall be rectified. Excessive thread damage or serious deformation of the valve body, handwheel, spindle or other components is cause for replacement.

Maintenance of the valve shall include general cleaning together with replacement of elastomers and worn or damaged components, packing and pressure relief devices, where necessary.

Where the use of lubricants/elastomers is permitted, they shall be compatible with both the solvent and acetylene in accordance with IS/ISO 11114-2.

After the valve has been re-assembled, it shall be checked for correct operation and shall undergo internal and external leak checks at intended operating pressure (for example, *see* IS 3224). This may be done prior to the valve being refitted to the cylinder.

ANNEX F

(*Foreword*)

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